

The Eighth Progress Report

**Total Phosphorus Load Calculations for Sites
Stipulated in the SFWMD/Seminole Tribe Agreement**

For the Period of

**May 1, 2001 to April 30, 2004
(WY2002 through WY2004)**

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Introduction

The Agreement between the South Florida Water Management District (the District) and the Seminole Tribe of Florida (the Seminole Tribe, or Tribe), executed on January 17, 1996, requires periodic monitoring of the quality of surface water entering and leaving the Big Cypress Seminole Indian Reservation (the Reservation). The objectives of the monitoring are to ensure compliance with applicable water quality standards imposed by law and that the overall surface water quality within the Reservation is not adversely impacted.

Pursuant to the Agreement, the District, with the cooperation of the Seminole Tribe, initiated a water quality monitoring program in June 1996. To help the SFWMD/Seminole Agreement Working Group track the results and progress of this monitoring effort, the District has been preparing reports that summarize and analyze the water quality and flow data collected since the implementation of the program. The main focus of the report has been the total phosphorus (TP) loads at the monitoring sites.

There were six (6) original Agreement sites that were monitored by the District: L3 Canal Sampling Station (L3BRS/USL3BRS), U.S. Sugar Outfall (USSO) from the C-139 Annex, the S140 Pump Station Complex (S140), West Feeder Canal (WFEED), North Feeder Canal (NFEED), and S190 Spillway (S190).

Two (2) sites monitored by the Seminole Tribe are the L28 Interceptor Canal North (L28IN) and L28 Canal Upstream (L28U). The Seminole Tribe began collecting water quality samples at these sites on August 21, 1997 in conjunction with the United States Geological Survey's (USGS) flow monitoring, which started on March 1, 1997.

To meet the intended objectives of the Agreement and to maximize sampling efficiency, the District has made changes to both locations and sampling methods over the years.

- The West Feeder Canal monitoring site (WFEED) was relocated 150 feet downstream to its current location at the weir (WWEIR) in December 1997 in order to monitor flow and loads more accurately.
- Monitoring at the “Confusion Corner” of the Seminole Big Cypress Reservation has also changed over time as a portion of the Tribe’s water entitlement is allocated through a new pump station G409. This station is located 100 feet downstream of the L3BRS site and is designed to deliver up to 190 cubic feet per second (cfs) of water to the Reservation from the L3 Canal. The District initiated flow monitoring and water quality sampling with a time composite automatic sampler at this location in June 2001. The automatic sampler was changed to collect flow proportional composites in November 2004.
- USL3BRS automatic sampler water quality sample collection was terminated in September 2002. However, the grab sample water quality monitoring at L3BRS

(Oil Well Bridge) and flow monitoring at the upstream (USL3BRS) UVM are still maintained.

- The NFEED site was equipped with an ultrasonic velocity meter (UVM) to measure flow and an automatic sampler for measuring concentrations coming into the Reservation within the North Feeder Canal. However, due to the unique circulation pattern, the flow measurement at the site had been problematic. Therefore, it was mutually agreed that the inflow from the North Feeder Canal can be more accurately measured at structures G108 and PC17A Culverts that discharge to the North Feeder upstream of the NFEED site. The District was already receiving flow and TP concentration data from the McDaniel Ranch as required in their Environmental Permit (No. 26-00623-P). The District has since implemented flow monitoring at these two (2) structures in late June 1999 and water quality monitoring in March 2004. For the Water Year 2004 (WY2004: May 1, 2003 through April 30, 2004), these two sites, PC17A and G108, became the monitoring points for the North Feeder Canal in lieu of NFEED. Flow measurement at NFEED using the UVM information was terminated at the end of February 2004.

Historical and current water quality sampling and flow measurement sites established for the Seminole Agreement are indicated in Figure 1. This eighth progress report includes data for Water Years 2002 through 2004 (WY2002, WY2003 and WY2004: May 1, 2001 through April 30, 2004). The results of TP load calculations for the monitoring sites are also presented.

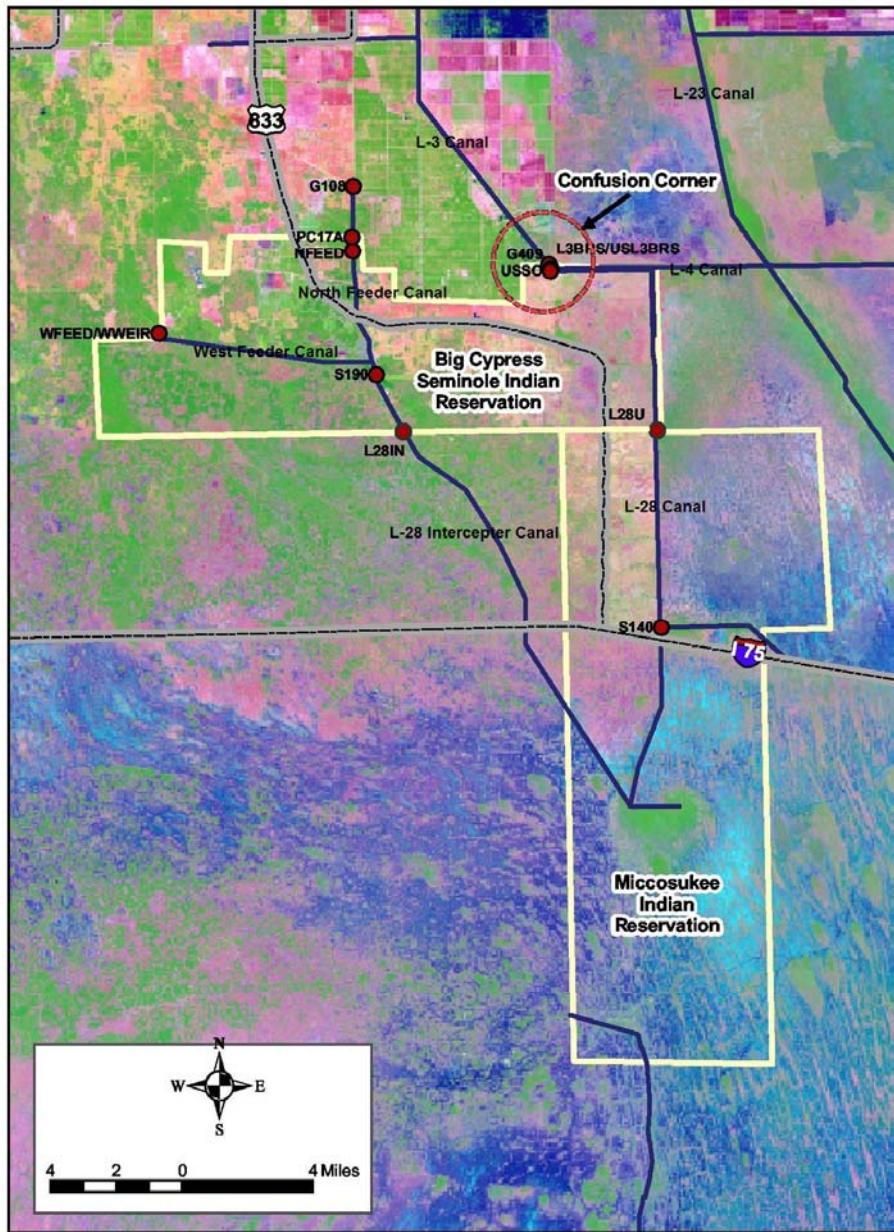


Figure 1. Historical and current SFWMD/Seminole Agreement water quality and flow monitoring sites.

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Methods

Currently, the USL3BRS, G409, USSO, S140, WWEIR, PC17A, G108, and S190 sites are maintained and monitored for flow by the District. The L28U and L28IN sites are the responsibility of the Seminole Tribe.

The USSO and USL3BRS sites are equipped with ultrasonic velocity meters (UVMs) to measure flow. The WWEIR site uses a weir equation to calculate flow. Flows through S190, S140, G108, PC17A and G409 are calculated using structure-specific equations. The Seminole sites, L28IN and L28U, are equipped with UVMs that were installed and maintained by contract with the USGS.

Flow information measured by the UVM for USSO had missing data for the periods July 18 through August 6, 2001; March 2, 2003 through January 25, 2004; July 3 through August 5, 2004; and January 29 through February 17, 2005. The missing data are estimated by the District's Operations and Hydro Data Management Division using a 2nd order polynomial regression equation from the analysis between USSO flow data and the G89 downstream UVM flow data. Instances where there were flows from the G89 canal were identified and removed from the data set used for the regression. The evaluation of the regression showed a good fit during the low as well as high flow periods.

Water quality sample collection methods can be combinations of automatic sampler (either flow proportional or time) composite sampling and grab sampling. Water quality samples are collected at L3BRS, G409, USSO, S140, WWEIR, PC17A, G108, and S190 sites by the District while the Tribe collects at the L28IN and L28U sites.

- At L3BRS, water quality monitoring by grab sampling is maintained while the flow proportional composite automatic sampler sampling (at USL3BRS) was discontinued in September 2002.
- At G409, the grab sampling started in June 2000 and a time composite automatic sampler was installed in May 2001. This automatic sampler was recently switched to flow proportional composite sampling (November 2004).
- At USSO and WWEIR (formerly WFEED), water qualities are monitored by both grabs and flow proportional composite samplers.
- Prior to July 2000, water quality data were collected at S140 and S190 using grab sampling only. Automatic samplers were installed at S140 and S190 in July 2000 to collect time composite samples. They were then switched to flow proportional composite in July 2002 and in December 2002, respectively.

- The NFEED site at the North Feeder Canal was equipped with automatic samplers to collect flow proportional composite water quality samples, but as mentioned earlier, water quality monitoring at this site was terminated in March 2004. Per mutual agreement, it was decided that the PC17A and G108 sites could provide the necessary water quality information in lieu of the NFEED location. Both of these sites were previously equipped with automatic samplers that were owned and operated by the McDaniel Ranch. In WY2004, there was a transition to a District owned and operated automatic sampler at PC17A and the same is expected in the near future for G108. The District monitored flow at both sites in WY2004. The water quality data for WY2004 at the PC17A site used District sampled grabs and automatic sampler composite samples. For G108, District sampled grabs and McDaniel Ranch sampled automatic sampler composite samples were used for WY2004.
- The Seminole Tribe maintains and operates automatic samplers at the L28IN and L28U sites to collect flow proportional composite samples with associated grabs.

The following algorithm for calculating TP loads is used at each structure when both the automatic sampler composite data and the grab sample data are available.

- a) Fill in the automatic sampler composite concentration as the daily TP concentration for the 14 days including and prior to the sample collection day or back to the prior auto-sampler collection day, whichever is shorter.
- b) If the interval is longer than 14 days, there will be a gap between the daily concentration values. Fill the gap by interpolating the two adjacent grab sample data collected on flow days.
- c) Calculate daily load by multiplying daily TP concentration with corresponding daily flow. Sum up daily loads.

In other words, automatic sampler composite concentrations were used for the daily values first. If there was a gap in the automatic sampler daily values, grab concentrations taken on flow days are interpolated and used to fill the gap. When the automatic sampler data interval was longer than 21 days, then the missing daily values and the missing automatic sampler data were filled by interpolating with adjacent data.

Where only grab concentrations are available, the interpolated grab concentration values were used for the load calculation. For example, at the USL3BRS/L3BRS site, there was no automatic sampler concentration available after September 2002 and therefore only the interpolated grab concentration values were used for the load calculation for that period.

Since there were no grab samples and only automatic sampler composite data available at PC17A and at G108 for the reporting period, the composite concentrations were applied up to 21 days backwards from the collection date.

Results

Flow data for WY2002 through WY2004 (May 1, 2001 through April 30, 2004) at the monitoring sites are summarized in Table 1. It should be noted that the UVM is capable of producing small positive or negative signals (line velocities) caused by local circulation at no flow conditions. The reverse or negative flows which are recorded at the UVM equipped monitoring sites are due to these small negative line velocities during no flow periods.

Grab sample TP concentration data at the monitoring sites are summarized for WY2002 through WY2004 in Table 2. Because the concentrations during flow and no flow conditions could be significantly different, summary statistics for grab samples collected only on days with flow at the site are presented in the parentheses.

Composite sample TP concentration data collected with automatic samplers at the monitoring sites are summarized for WY2002 through WY2004 in Table 3. The following data are considered as outliers for their respective sites and were eliminated from the subsequent analysis and load calculations:

- One S140 time composite, 783 ppb, taken during a no flow period, collected on March 26, 2003.
- One L28U flow proportional composite, 3870 ppb, collected (by Seminole Tribe) on December 4, 2002.

Table 4 presents the summary of TP data used for the load calculations for WY2002 through WY2004.

TP concentration data at the western six (6) feeder-canal system sampling sites and the four (4) “Confusion Corner” system sampling sites for WY2002 through WY2004 except for NFEED (WY2002 and WY2003), PC17A (WY2004), and G108 (WY2004) are presented as box plots in Figure 2 after eliminating the outliers. The horizontal line in each box represents the median concentration. The top and bottom of the box represent the 75th and 25th percentiles, respectively. The whiskers show the range of values falling within 1.5 times the absolute value of the difference between the 75th and 25th percentiles. Values outside the whiskers, plotted with plus signs, are greater than 1.5 times the absolute value of the difference between the 75th and 25th percentiles.

For the reporting period, the TP concentrations among the monitoring sites were generally similar. However, the eastern system sites (*e.g.*, L3BRS/USL3BRS, G409, USSO, L28U, S140) showed much greater variation in concentrations than that in the western system sites (*e.g.*, WWEIR, NFEED, PC17A, G108, S190, L28IN).

The total phosphorus load graph for each site (Figures 3 through Figure 13) summarizes:

- Daily mean flows, expressed in cubic feet per second (cfs).

- Individual TP concentrations in parts per billion (ppb) from auto and grab samples.
- The resulting calculated daily TP loads in kilograms (kg) from May 1, 2001 through April 30, 2004.

Monthly flows for the eleven monitored sites are presented in Table 5. Monthly TP loads and flow-weighted mean concentrations are presented separately in Table 6 and Table 7, respectively.

The summary of physical parameters measured at the District monitoring sites are presented as an appendix.

Table 1. Summary of flow data at the monitoring sites for each water year.

station	periods	total days	positive flow days	reverse flow days	days w/ missing data	total flow in cfs-days	total flow in 1000 ac-ft
USL3BRS	WY02	365	248	117	0	14181	28
	WY03	365	180	154	31	20216	40
	WY04	366	144	146	76	5617	11
G409	WY02	365	22	0	0	2152	4
	WY03	365	12	1	0	51	0
	WY04	366	63	0	0	3529	7
USSO	WY02	365	365	0	0	19018	38
	WY03	365	364	0	0	22143	44
	WY04	366	365	0	0	23624	47
L28U	WY02	365	311	45	9	33608	67
	WY03	365	329	36	0	45270	90
	WY04	366	341	19	6	46694	93
S140	WY02	365	189	0	0	55478	110
	WY03	365	200	1	0	68780	136
	WY04	366	219	0	0	68644	136
WWEIR	WY02	365	295	0	0	26933	53
	WY03	365	299	0	0	25689	51
	WY04	366	308	0	6	32272	64
NFEED	WY02	365	119	114	132	1755	3
	WY03	365	162	116	86	4320	9
PC17A*	WY04	366	125	60	0	5365	11
G108	WY04	366	74	0	0	6198	12
S190	WY02	365	223	0	0	42863	85
	WY03	365	233	0	0	44398	88
	WY04	366	252	0	0	59340	118
L28IN	WY02	365	238	127	0	43211	86
	WY03	365	244	99	22	41279	82
	WY04	366	219	128	19	50107	99

Note: * March 2, 2004 through April 30, 2004 daily flow data for PC17A are missing. However, zero flow was assumed for that period at the structure.

Table 2. Summary of grab sample total phosphorus (TP) concentration data at the monitoring sites for each water year.

station	period	total sample n	min (mg/L)	max (mg/L)	mean (mg/L)	FWMC (mg/L)
L3BRS	WY2002	27 (20)	0.008 (0.015)	0.468 (0.468)	0.083 (0.090)	0.330
	WY2003	36 (23)	0.012 (0.012)	0.350 (0.350)	0.108 (0.142)	0.232
	WY2004	26 (12)	0.013 (0.013)	0.379 (0.379)	0.086 (0.079)	0.267
G409	WY2002	4 (4)	0.066 (0.066)	0.091 (0.091)	0.078 (0.078)	0.077
	WY2003	26 (1)	0.011 (0.037)	0.171 (0.037)	0.032 (0.037)	0.037
	WY2004	52 (11)	0.013 (0.021)	0.375 (0.086)	0.074 (0.046)	0.039
USSO	WY2002	23 (23)	0.037 (0.037)	0.157 (0.157)	0.079 (0.079)	0.087
	WY2003	48 (47)	0.022 (0.022)	0.762 (0.762)	0.086 (0.087)	0.110
	WY2004	52 (51)	0.021 (0.021)	0.229 (0.229)	0.056 (0.057)	0.062
L28U	WY2002	6 (4)	0.030 (0.030)	0.120 (0.120)	0.059 (0.069)	0.072
	WY2003	26 (25)	0.014 (0.014)	0.116 (0.116)	0.051 (0.053)	0.054
	WY2004	19 (19)	0.027 (0.027)	0.075 (0.075)	0.048 (0.048)	0.051
S140	WY2002	16 (13)	0.018 (0.018)	0.137 (0.137)	0.046 (0.051)	0.044
	WY2003	35 (24)	0.018 (0.024)	0.174 (0.174)	0.042 (0.048)	0.059
	WY2004	51 (32)	0.018 (0.026)	0.063 (0.063)	0.035 (0.038)	0.039
WWEIR	WY2002	53 (42)	0.019 (0.019)	0.077 (0.077)	0.043 (0.042)	0.049
	WY2003	52 (43)	0.018 (0.018)	0.167 (0.167)	0.050 (0.047)	0.050
	WY2004	52 (43)	0.018 (0.018)	0.158 (0.158)	0.048 (0.048)	0.065
NFEED	WY2002	53 (16)	0.028 (0.028)	0.229 (0.095)	0.073 (0.048)	0.041
	WY2003	52 (19)	0.019 (0.019)	0.220 (0.220)	0.067 (0.070)	0.098
PC17A	WY2004	7 (0)	0.018 (n/a)	0.053 (n/a)	0.030 (n/a)	n/a
G108	WY2004	7 (0)	0.077 (n/a)	0.160 (n/a)	0.109 (n/a)	n/a
S190	WY2002	16 (13)	0.018 (0.018)	0.186 (0.186)	0.060 (0.064)	0.104
	WY2003	17 (13)	0.018 (0.026)	0.130 (0.130)	0.058 (0.066)	0.085
	WY2004	21 (17)	0.017 (0.019)	0.155 (0.155)	0.053 (0.058)	0.107
L28IN	WY2002	4 (2)	0.020 (0.020)	0.040 (0.025)	0.030 (0.023)	0.020
	WY2003	23 (14)	0.014 (0.014)	0.122 (0.122)	0.052 (0.060)	0.065
	WY2004	21 (12)	0.021 (0.024)	0.127 (0.127)	0.050 (0.060)	0.094

Note: The values for samples taken on flow days are presented in parentheses.

Table 3. Summary of auto sampler composite total phosphorus (TP) concentration data for each water year.

station	period	sample n	min (mg/L)	max (mg/L)	mean (mg/L)	FWMC (mg/L)
USL3BRS ^{*1}	WY02	33	0.020	0.489	0.102	0.363
	WY03	18	0.094	0.362	0.190	0.271
G409	WY02	40	0.012	0.414	0.065	0.045
	WY03	49	0.012	0.414	0.082	0.069
	WY04	48	0.017	0.250	0.067	0.044
USSO	WY02	50	0.028	0.246	0.076	0.087
	WY03	49	0.026	0.577	0.082	0.102
	WY04	42	0.021	0.401	0.082	0.047
L28U ^{*2}	WY02	12	0.010	0.140	0.053	0.079
	WY03	40	<0.002	3.870*	0.155	0.087
	WY04	36	0.019	0.098	0.057	0.061
S140 ^{*2}	WY02	53	0.019	0.783*	0.055	0.058
	WY03	39	0.021	0.133	0.050	0.057
	WY04	33	0.018	0.069	0.040	0.042
WWEIR	WY02	39	0.020	0.091	0.047	0.059
	WY03	42	0.021	0.156	0.049	0.053
	WY04	41	0.022	0.235	0.067	0.098
NFEED	WY02	49	0.033	0.239	0.074	0.055
	WY03	52	0.026	0.185	0.064	0.088
PC17A	WY04	6	0.081	0.189	0.117	0.115
G108	WY04	6	0.075	0.153	0.108	0.126
S190	WY02	53	0.023	0.128	0.051	0.080
	WY03	40	0.022	0.126	0.060	0.082
	WY04	30	0.025	0.159	0.075	0.102
L28IN	WY02	10	0.014	0.080	0.045	0.039
	WY03	40	0.003	0.144	0.062	0.047
	WY04	37	0.017	0.171	0.072	0.096

Notes: *1 Automatic sampler sampling at USL3BRS was discontinued in September 2002.

2 The concentration data, marked with asterisks () in the table, are excluded from the TP load calculations as outlier values.

Table 4. Summary of TP data used for the load calculations for WY02 through WY04.

station	period	type	first datum	last datum	sample n	min (mg/L)	max (mg/L)	avg (mg/L)	S.E.
L3BRS / USL3BRS	WY2002	composite	5/2/2001	4/30/2002	33	0.020	0.489	0.102	0.123
		grab	5/2/2001	4/16/2002	27	0.008	0.468	0.083	0.105
	WY2003	composite	5/7/2002	9/16/2002	18	0.094	0.362	0.190	0.093
		grab	5/14/2002	4/28/2003	36	0.012	0.350	0.108	0.092
	WY2004	grab	5/12/2003	4/27/2004	26	0.013	0.379	0.086	0.092
	WY2002	composite	5/30/2001	4/30/2002	40	0.012	0.414	0.065	0.084
		grab	5/9/2001	6/6/2001	4	0.066	0.091	0.078	0.010
	WY2003	composite	5/7/2002	4/28/2003	49	0.012	0.414	0.082	0.088
		grab	6/18/2002	4/28/2003	26	0.011	0.171	0.032	0.032
	WY2004	composite	5/5/2003	4/27/2004	48	0.017	0.250	0.067	0.061
		grab	5/5/2003	4/27/2004	52	0.013	0.375	0.074	0.078
G409	WY2002	composite	5/2/2001	4/30/2002	50	0.028	0.246	0.076	0.042
		grab	5/31/2001	4/1/2002	23	0.037	0.157	0.079	0.034
	WY2003	composite	5/7/2002	4/22/2003	49	0.026	0.577	0.082	0.100
		grab	5/28/2002	4/28/2003	48	0.022	0.762	0.086	0.117
	WY2004	composite	5/5/2003	4/27/2004	42	0.021	0.401	0.082	0.081
		grab	5/5/2003	4/27/2004	52	0.021	0.229	0.056	0.032
USSO	WY2002	composite	5/2/2001	4/30/2002	50	0.028	0.246	0.076	0.042
		grab	5/31/2001	4/1/2002	23	0.037	0.157	0.079	0.034
	WY2003	composite	5/7/2002	4/22/2003	49	0.026	0.577	0.082	0.100
		grab	5/28/2002	4/28/2003	48	0.022	0.762	0.086	0.117
	WY2004	composite	5/5/2003	4/27/2004	42	0.021	0.401	0.082	0.081
		grab	5/5/2003	4/27/2004	52	0.021	0.229	0.056	0.032
L28U	WY2002	composite	5/16/2001	1/10/2002	12	0.010	0.140	0.053	0.045
		grab	5/16/2001	4/25/2002	6	0.030	0.120	0.059	0.035
	WY2003	composite	7/17/2002	4/28/2003	39	0.002	0.170	0.060	0.031
		grab	5/1/2002	4/23/2003	26	0.014	0.116	0.051	0.025
	WY2004	composite	5/1/2003	3/31/2004	36	0.019	0.098	0.057	0.022
		grab	5/1/2003	3/31/2004	19	0.027	0.075	0.048	0.011
S140	WY2002	composite	5/1/2001	4/30/2002	52	0.019	0.123	0.041	0.021
		grab	5/22/2001	4/23/2002	16	0.018	0.137	0.046	0.030
	WY2003	composite	5/7/2002	4/29/2003	39	0.021	0.133	0.050	0.027
		grab	5/21/2002	4/29/2003	35	0.018	0.174	0.042	0.028
	WY2004	composite	5/6/2003	4/13/2004	33	0.018	0.069	0.040	0.009
		grab	5/6/2003	4/27/2004	51	0.018	0.063	0.035	0.009
WWEIR	WY2002	composite	6/14/2001	3/26/2002	39	0.020	0.091	0.047	0.018
		grab	5/1/2001	4/29/2002	53	0.019	0.077	0.043	0.014
	WY2003	composite	6/24/2002	4/14/2003	42	0.021	0.156	0.049	0.028
		grab	5/7/2002	4/29/2003	52	0.018	0.167	0.050	0.028
	WY2004	composite	5/28/2003	3/24/2004	41	0.022	0.235	0.067	0.046
		grab	5/6/2003	4/27/2004	52	0.018	0.158	0.048	0.028
NFEED	WY2002	composite	5/1/2001	4/29/2002	49	0.033	0.239	0.074	0.048
		grab	5/1/2001	4/29/2002	53	0.028	0.229	0.073	0.053
	WY2003	composite	5/7/2002	4/29/2003	52	0.026	0.185	0.064	0.040
		grab	5/7/2002	4/29/2003	52	0.019	0.220	0.067	0.050
PC17A	WY2004	composite	7/10/2003	10/17/2003	6	0.081	0.189	0.117	0.040
		grab	3/8/2004	4/27/2004	7	0.018	0.053	0.030	0.012
G108	WY2004	composite	7/10/2003	10/17/2003	6	0.075	0.153	0.108	0.031
		grab	3/8/2004	4/27/2004	7	0.077	0.160	0.109	0.032
S190	WY2002	composite	5/1/2001	4/29/2002	53	0.023	0.128	0.051	0.025
		grab	5/31/2001	4/29/2002	16	0.018	0.186	0.060	0.045
	WY2003	composite	5/7/2002	4/7/2003	40	0.022	0.126	0.060	0.032
		grab	5/13/2002	4/29/2003	17	0.018	0.130	0.058	0.035
	WY2004	composite	5/28/2003	1/13/2004	30	0.025	0.159	0.075	0.041
		grab	5/28/2003	4/27/2004	21	0.017	0.155	0.053	0.042
L28IN	WY2002	composite	5/24/2001	4/25/2002	10	0.014	0.080	0.045	0.018
		grab	6/21/2001	4/25/2002	4	0.020	0.040	0.030	0.009
	WY2003	composite	5/16/2002	4/28/2003	40	0.003	0.144	0.062	0.033
		grab	5/1/2002	4/23/2003	23	0.014	0.122	0.052	0.028
	WY2004	composite	5/7/2003	4/7/2004	37	0.017	0.171	0.072	0.040
		grab	5/1/2003	3/31/2004	21	0.021	0.127	0.050	0.034

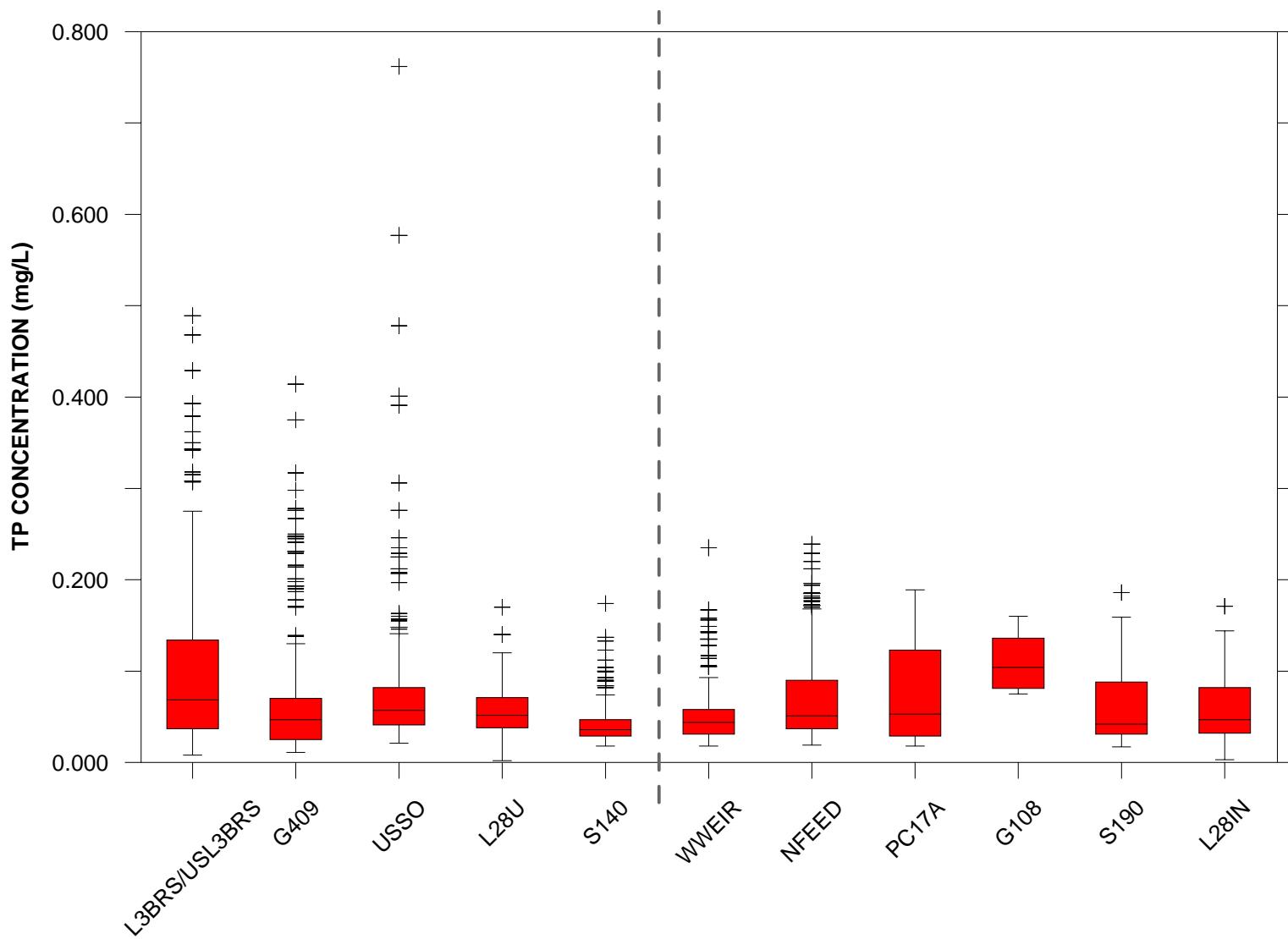


Figure 2. Comparison of total phosphorus (TP) concentrations among monitoring sites.

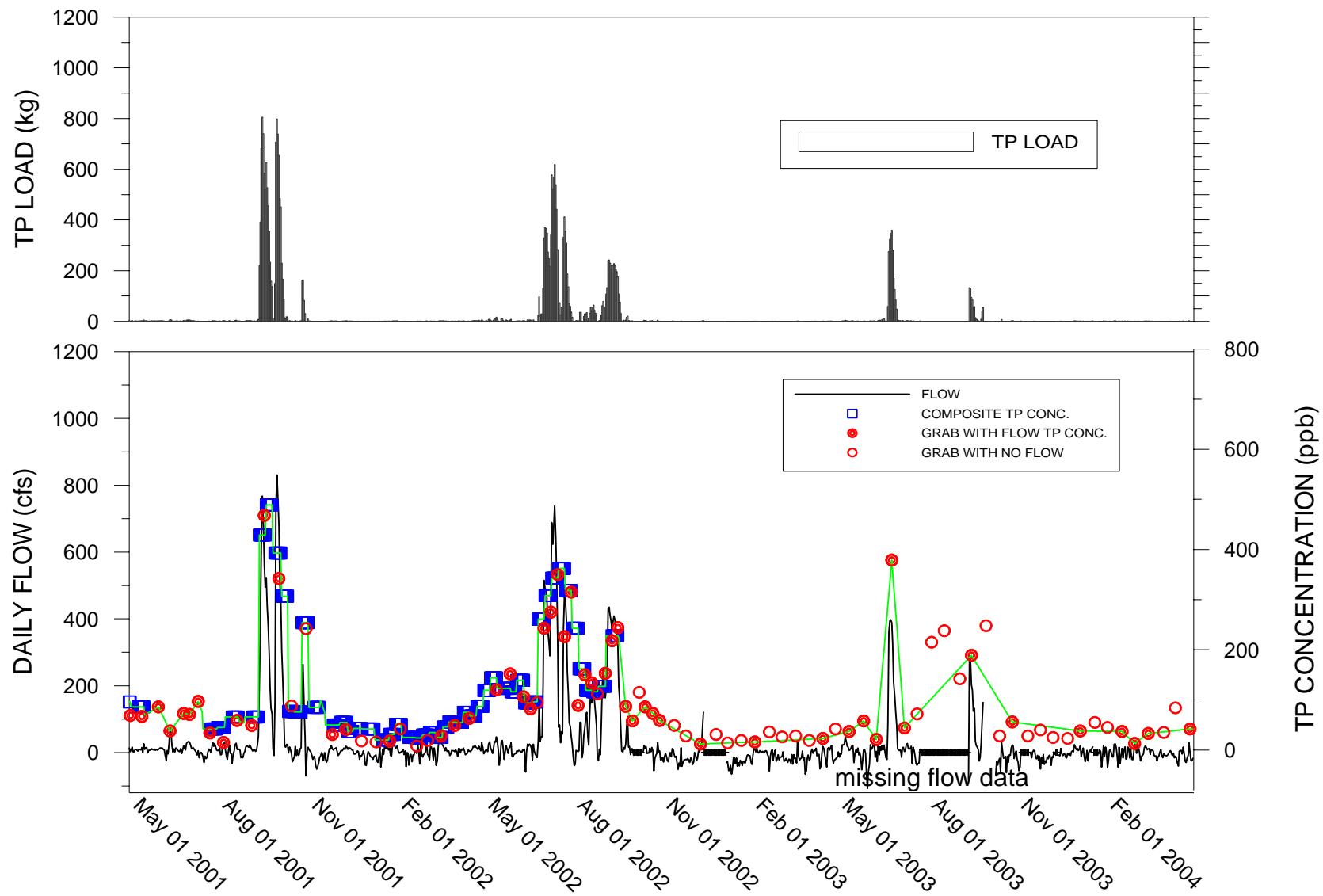


Figure 3. Flow, total phosphorus (TP) concentration, and TP loads at L3BRS/USL3BRS for WY2002 through WY2004.

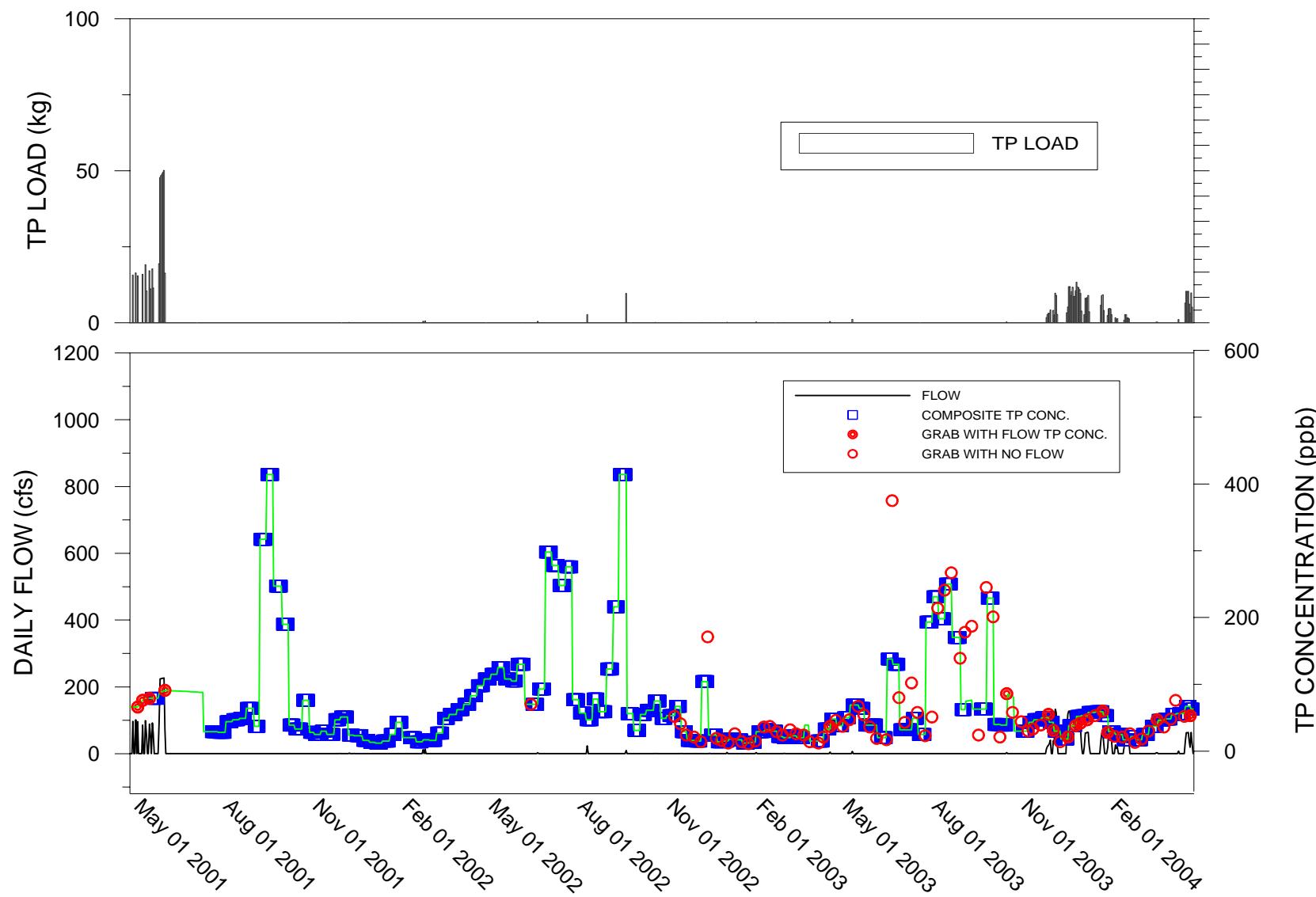


Figure 4. Flow, total phosphorus (TP) concentration, and TP loads at G409 for WY2002 through WY2004.

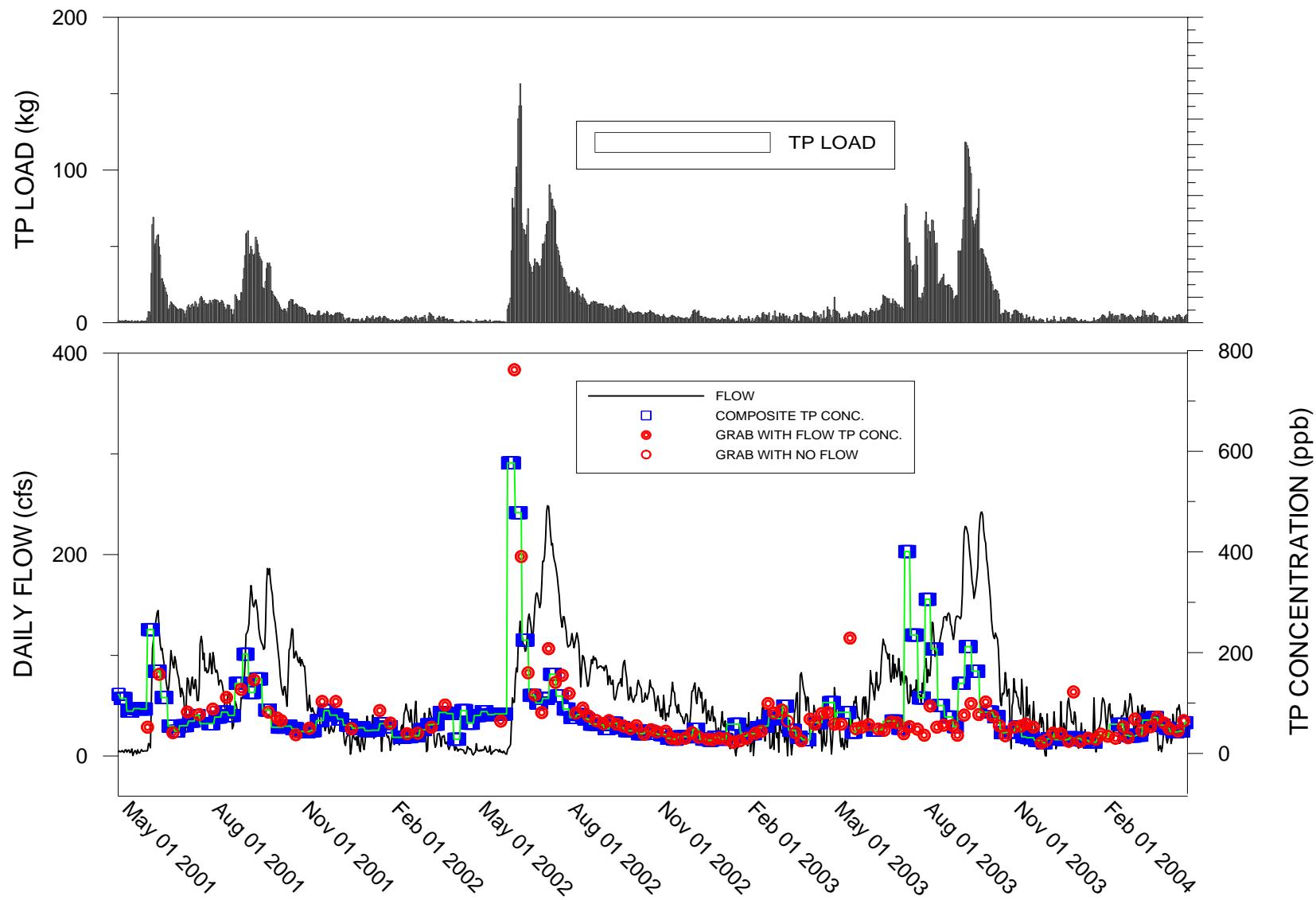


Figure 5. Flow, total phosphorus (TP) concentration, and TP loads at USSO for WY2002 through WY2004.

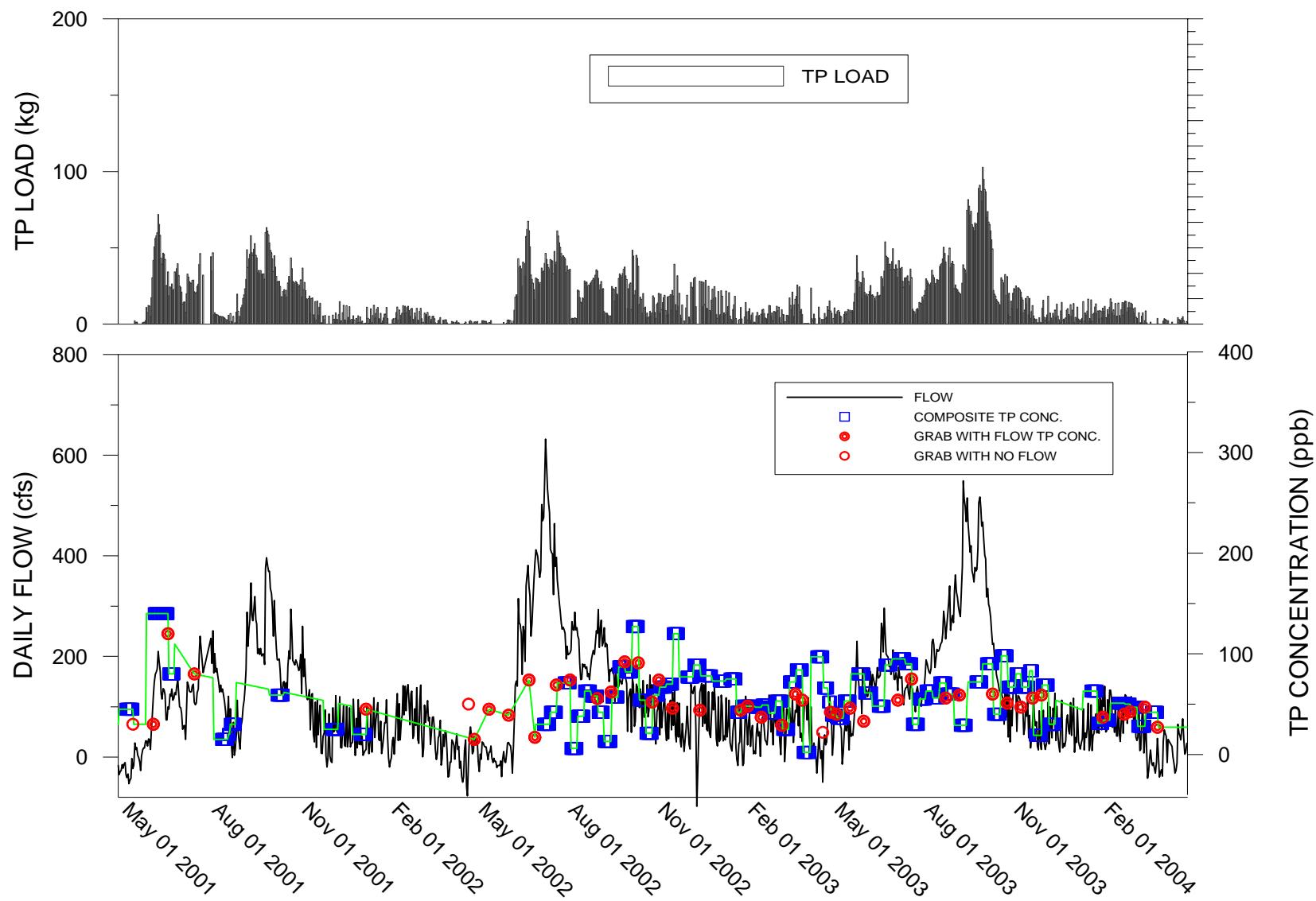


Figure 6. Flow, total phosphorus (TP) concentration, and TP loads at L28U for WY2002 through WY2004.

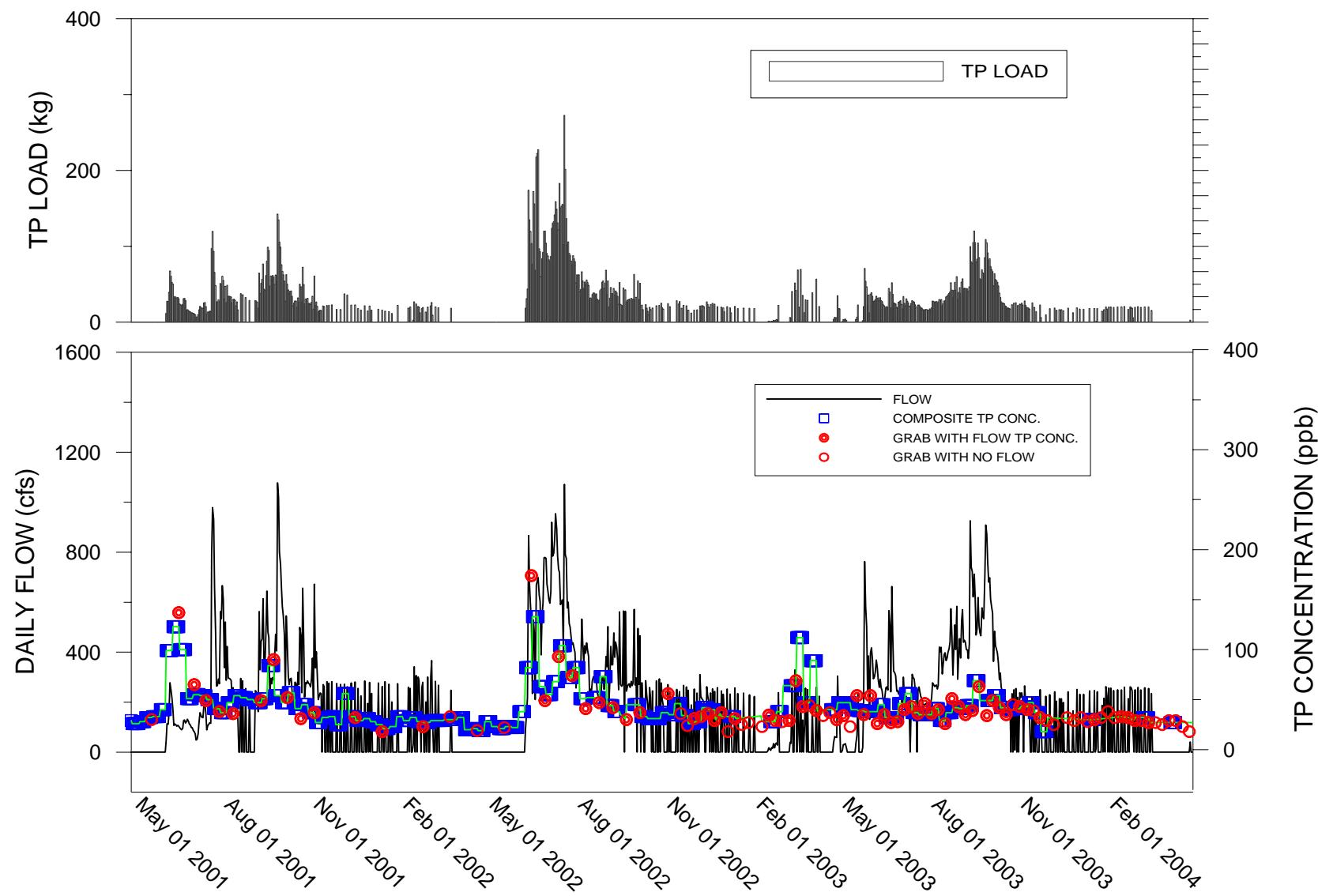


Figure 7. Flow, total phosphorus (TP) concentration, and TP loads at S140 for WY2002 through WY2004.

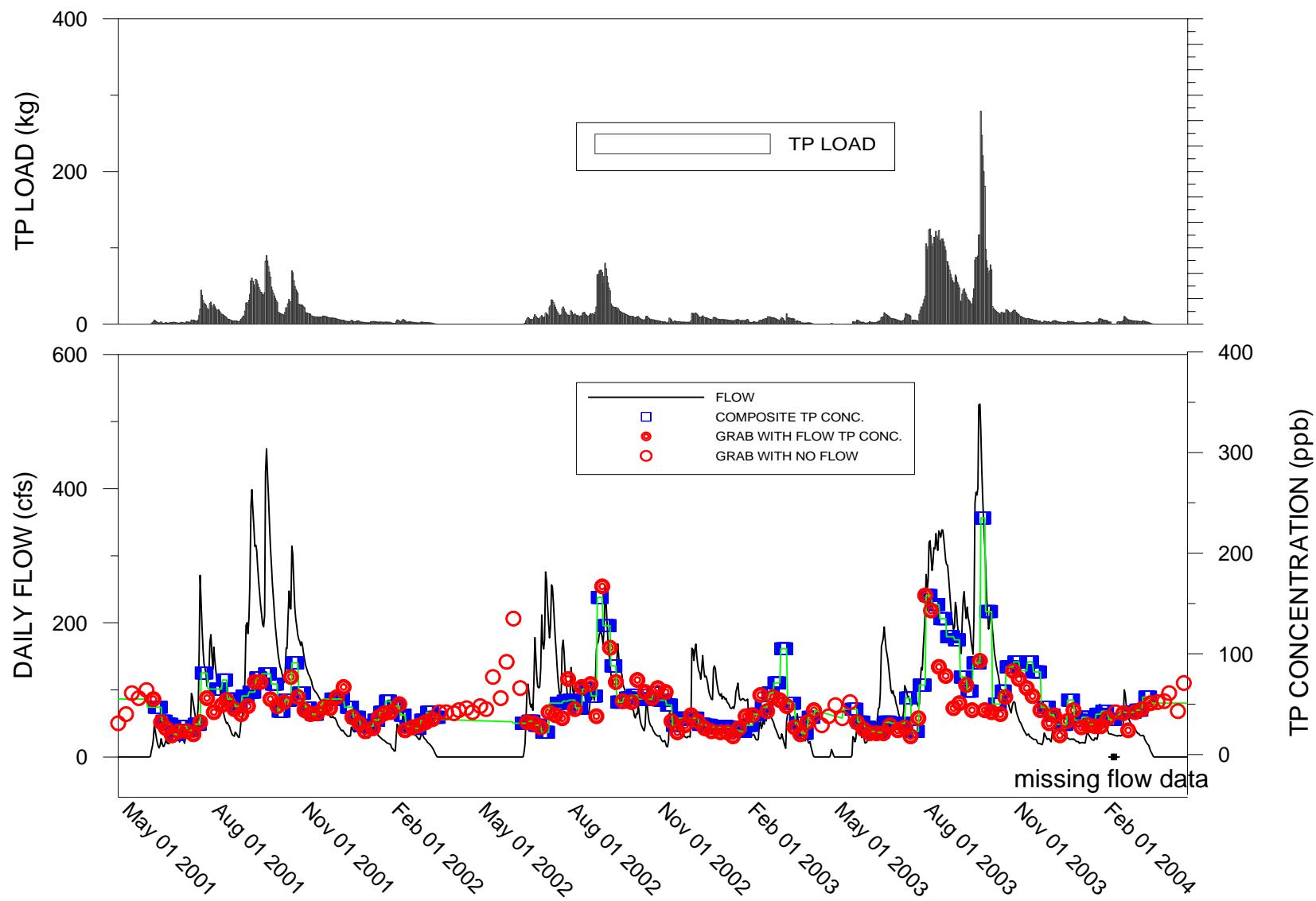


Figure 8. Flow, total phosphorus (TP) concentration, and TP loads at WWEIR for WY2002 through WY2004.

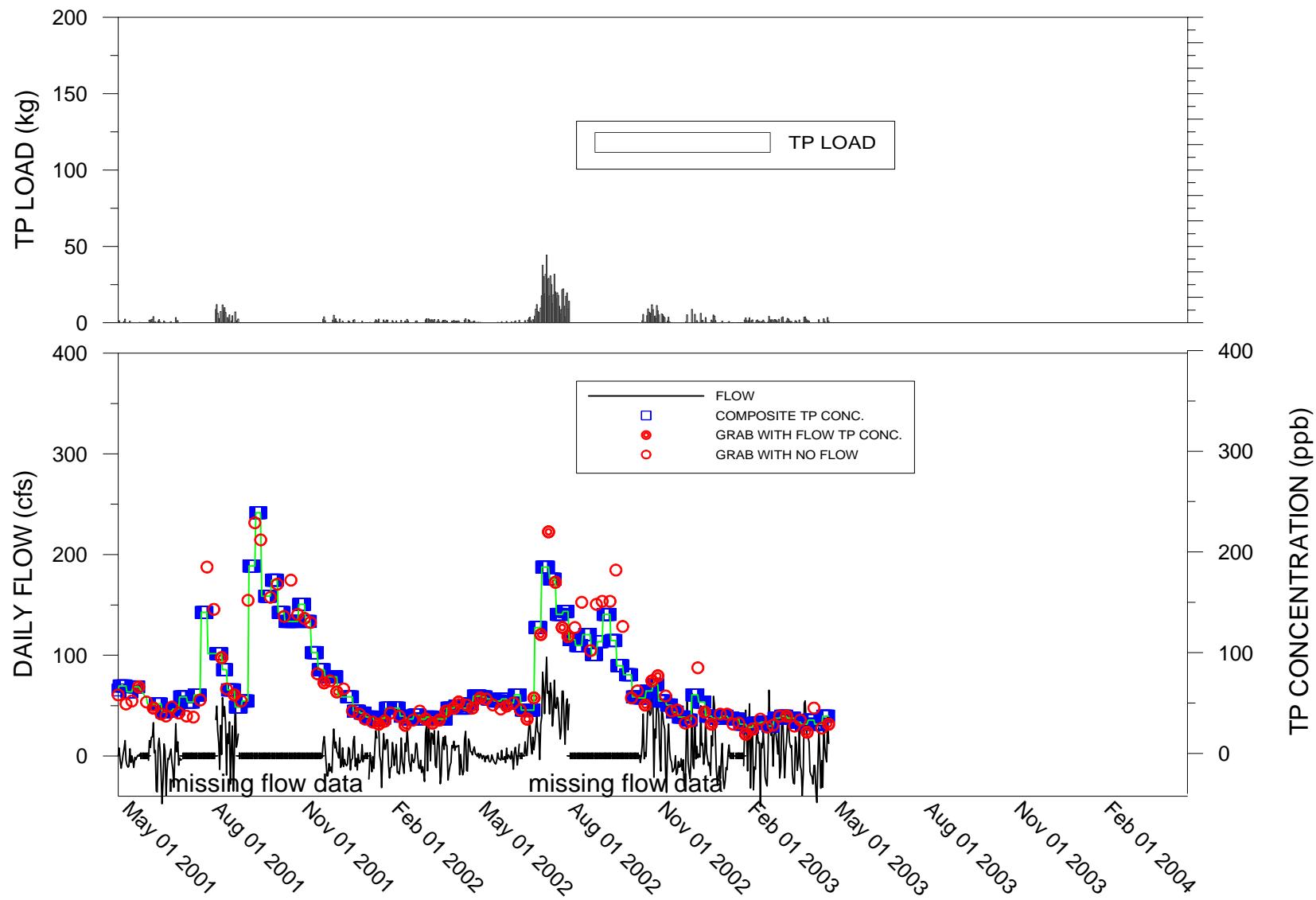


Figure 9. Flow, total phosphorus (TP) concentration, and TP loads at NFEED for WY2002 and WY2003.

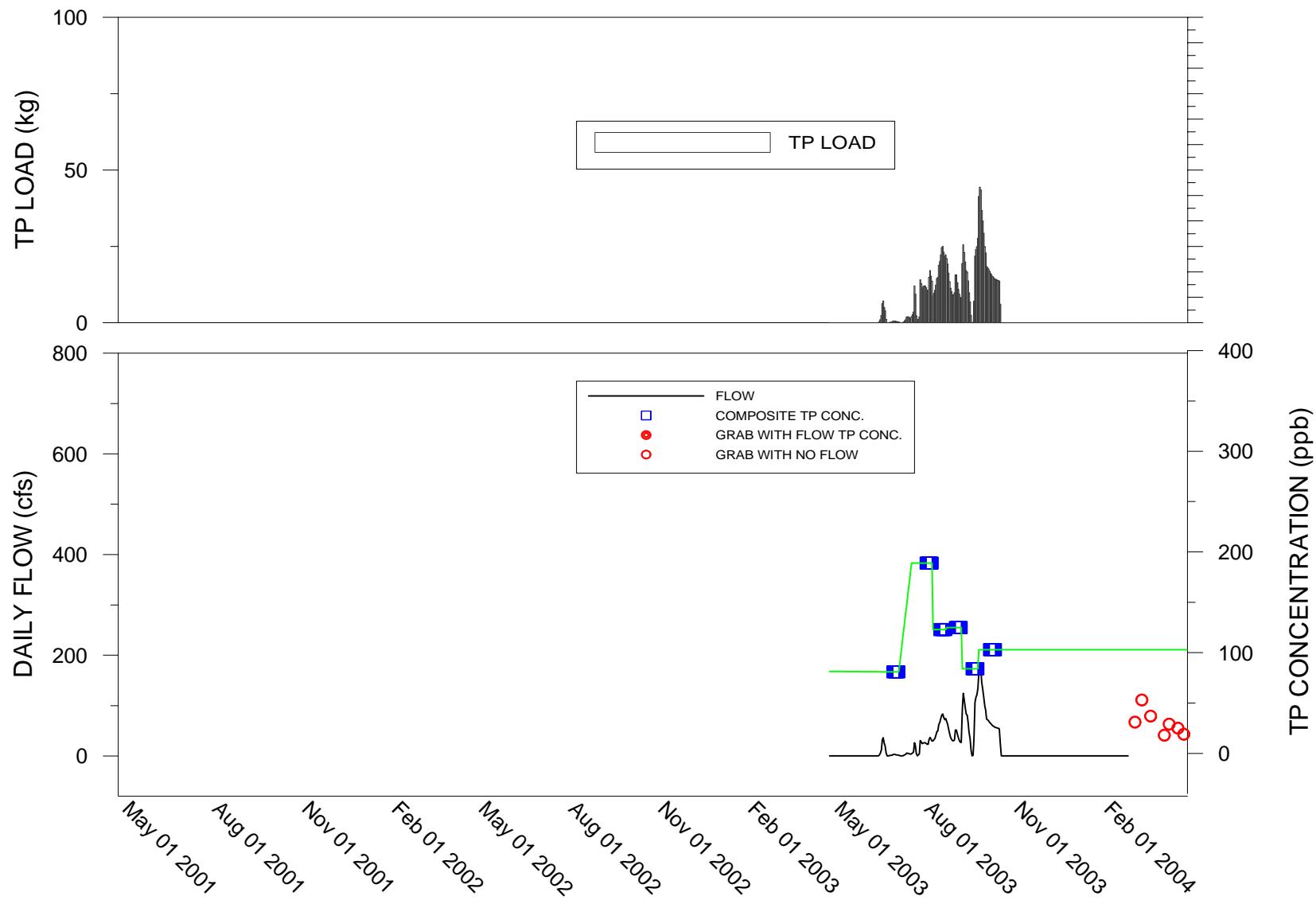


Figure 10. Flow, total phosphorus (TP) concentration, and TP loads at PC17A for WY2004.

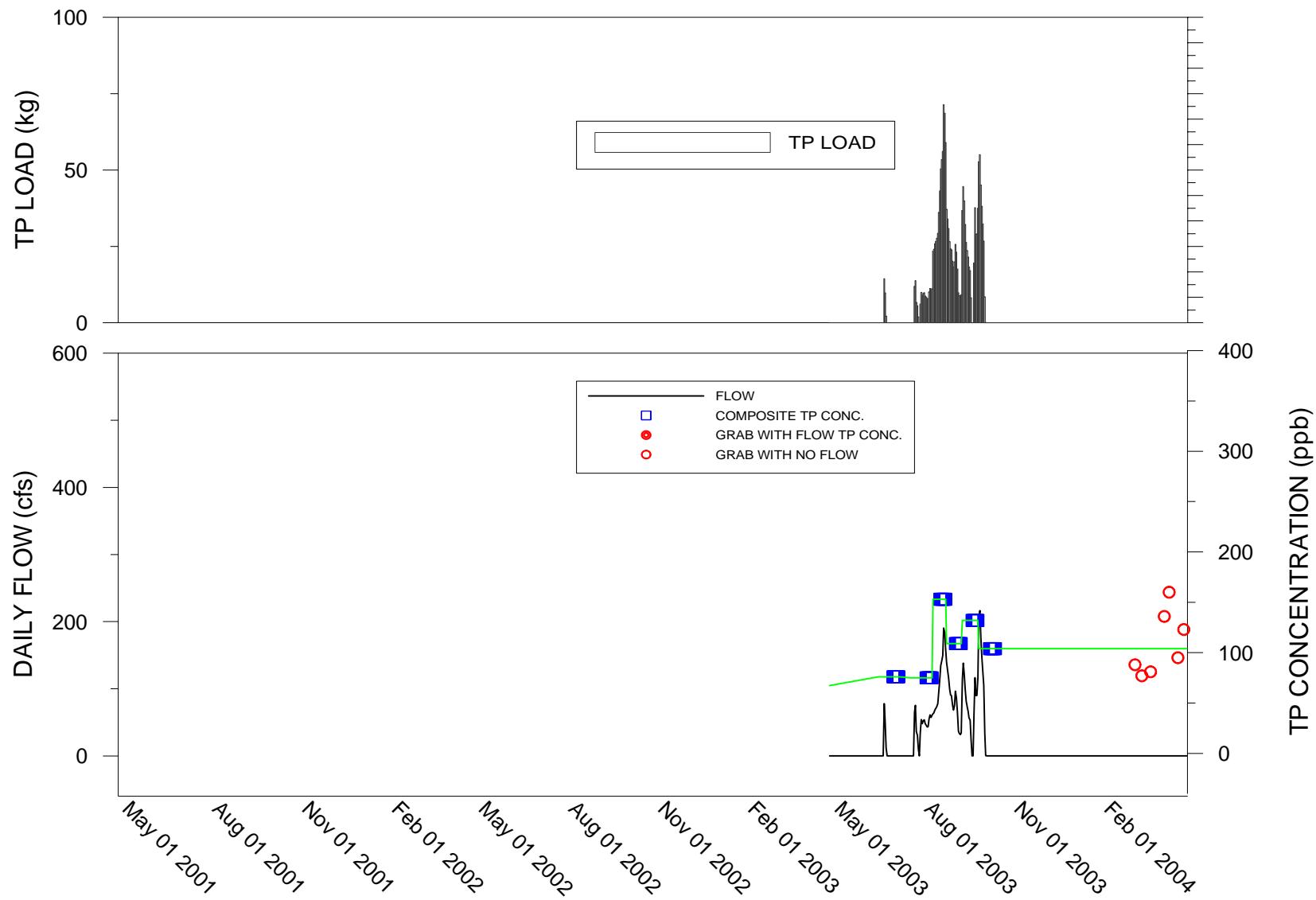


Figure 11. Flow, total phosphorus (TP) concentration, and TP loads at G108 for WY2004.

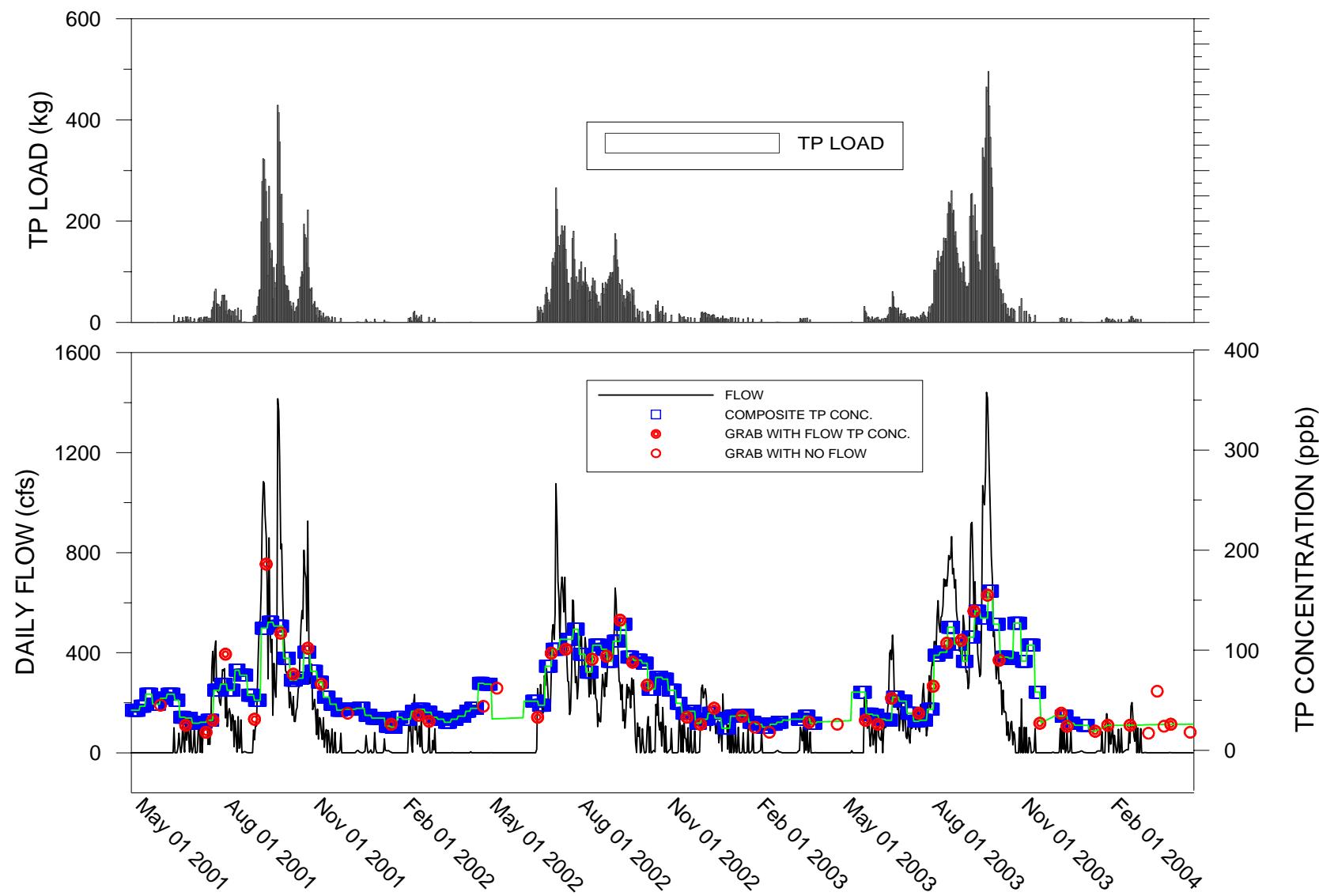


Figure 12. Flow, total phosphorus (TP) concentration, and TP loads at S190 for WY2002 through WY2004.

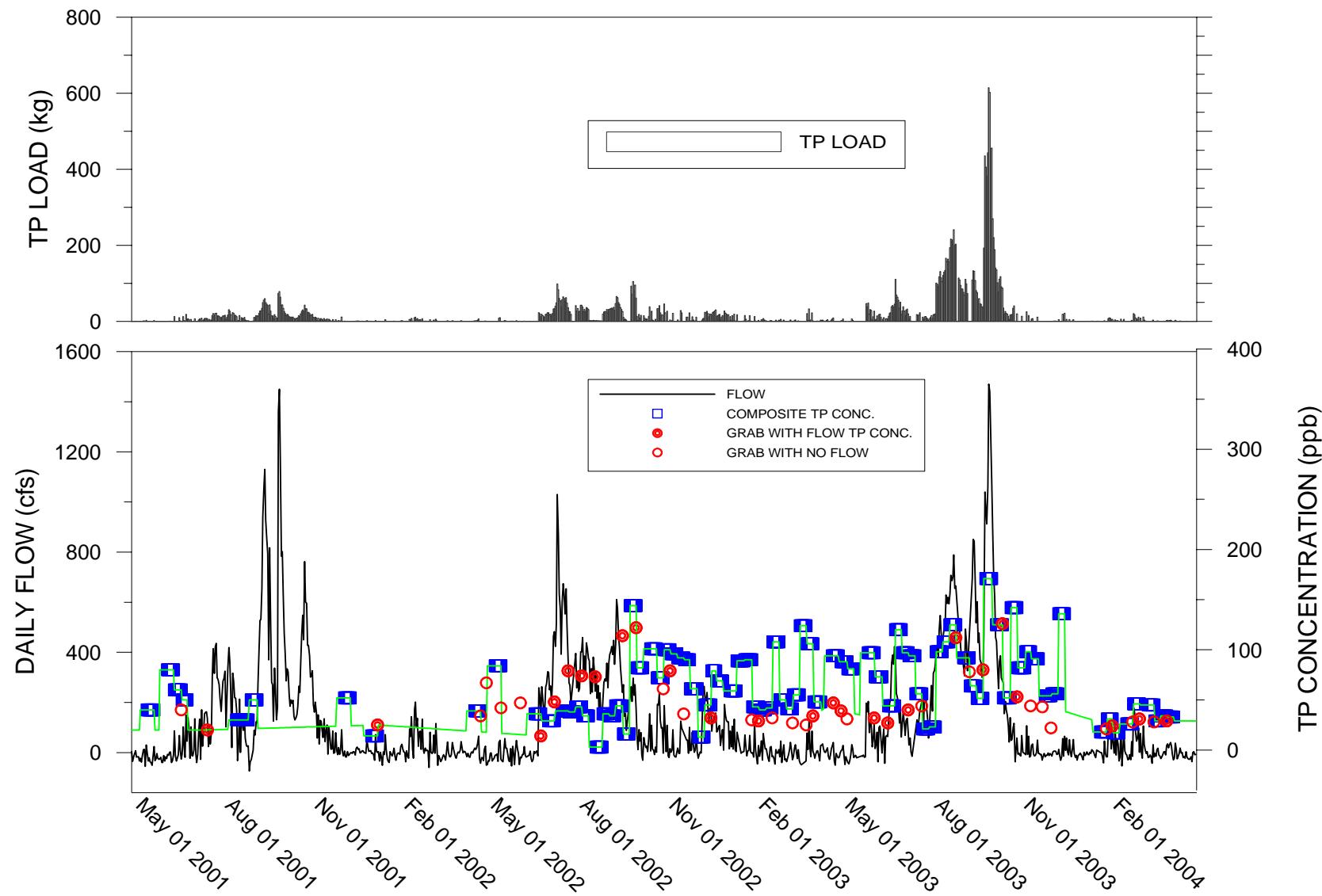


Figure 13. Flow, total phosphorus (TP) concentration, and TP loads at L28IN for WY2002 through WY2004.

Table 5. Monthly flows in acre-feet for WY02 through WY04.

month	L3BRS	G409	USSO	L28U	S140	WWEIR	NFEED	PC17A	G108	S190	L28IN
05/2001	550	1830	279	405	0	0	80			0	184
06/2001	840	2381	5415	7053	6401	1482	390		1631	1443	
07/2001	582	0	4525	6010	14755	5106	28		8878	9072	
08/2001	547	0	4122	6396	15074	5285	1042		6735	10048	
09/2001	15375	0	6818	12385	21393	13219	43		29793	28921	
10/2001	7804	0	6879	13636	23308	13402	0		27480	24841	
11/2001	265	0	3318	6288	11236	7016	78		6151	6049	
12/2001	325	6	1524	3000	4608	2830	279		473	567	
01/2002	433	0	1363	3132	4132	2154	300		453	403	
02/2002	215	25	1458	3859	4972	1896	252		2841	2770	
03/2002	637	27	1582	3457	4161	1031	578		571	846	
04/2002	555	0	436	1040	0	0	411		9	565	
05/2002	864	0	329	646	0	0	56		1	481	
06/2002	987	5	4796	10215	18615	1380	340		2929	3070	
07/2002	20800	0	11141	25045	42247	10294	2826		28651	24419	
08/2002	4206	47	6280	12803	19829	5937	451		18435	18627	
09/2002	11924	19	4731	11574	19936	9036	0		19058	17250	
10/2002	278	1	4046	7228	11403	4053	805		4772	4747	
11/2002	71	1	2937	4627	5135	2121	788		2279	1771	
12/2002	436	2	2989	4314	7081	6120	662		7051	6412	
01/2003	0	7	1467	3443	3995	5697	308		3073	2745	
02/2003	177	7	1471	2867	1365	2889	883		488	934	
03/2003	78	2	1555	4367	4467	2793	824		1155	768	
04/2003	277	9	2181	2664	2352	634	624		169	653	
05/2003	599	13	1877	4675	6149	694		0	0	1639	1726
06/2003	5426	0	4307	10132	19258	4653		276	283	9349	8428
07/2003	423	0	4510	8783	12850	5139		250	433	7949	5885
08/2003	0	0	6541	11653	21419	16881		2818	5415	34534	28790
09/2003	3113	0	10054	21907	32129	14047		3688	4556	35310	30651
10/2003	194	6	8270	14773	21203	12131		3609	1607	21840	18244
11/2003	49	0	2447	4844	6464	2729		0	0	1458	703
12/2003	129	3130	1523	3408	3837	2056		0	0	1057	677
01/2004	328	1933	1452	3325	3704	1684		0	0	558	382
02/2004	350	1133	2155	5090	6075	2341		0	0	3291	2502
03/2004	384	11	2206	2771	2984	1657		0	0	711	950
04/2004	146	773	1517	1256	81	0		0	0	4	448

Table 6. Monthly TP loads in kg for WY02 through WY04.

Month	L3BRS	G409	USSO	L28U	S140	WWEIR	NFEED	PC17A	G108	S190	L28IN
05/2001	56	170	35	30	0	0	7			0	8
06/2001	58	261	830	1084	774	61	23			75	76
07/2001	43	0	337	647	859	314	2			476	226
08/2001	39	0	382	251	816	418	100			549	327
09/2001	8137	0	1146	1033	1537	1128	2			4174	806
10/2001	3331	0	500	1012	1368	1158	0			3251	691
11/2001	26	0	204	431	441	454	8			546	175
12/2001	19	0	128	132	205	179	21			22	23
01/2002	15	0	83	143	132	90	13			17	10
02/2002	8	1	62	164	182	89	12			132	77
03/2002	26	1	104	121	147	43	25			25	22
04/2002	50	0	35	25	0	0	23			0	21
05/2002	137	0	32	23	0	0	4			0	25
06/2002	248	0	1813	758	2192	55	19			165	118
07/2002	8366	0	1656	1200	3844	476	567			3640	1096
08/2002	654	3	572	687	1467	403	75			2222	561
09/2002	3087	10	321	643	1057	1198	0			2401	1050
10/2002	25	0	216	648	539	281	61			461	557
11/2002	4	0	121	436	232	116	56			135	196
12/2002	7	0	129	424	315	244	38			287	399
01/2003	0	0	71	299	161	184	13			103	220
02/2003	4	0	88	166	57	139	30			16	53
03/2003	2	0	107	300	410	204	35			46	79
04/2003	8	0	136	132	173	20	24			6	63
05/2003	28	1	153	350	299	33		0	0	94	204
06/2003	2116	0	281	782	865	156		28	27	453	738
07/2003	42	0	894	867	661	224		50	40	365	421
08/2003	0	0	1207	894	965	2794		488	845	4287	3583
09/2003	688	0	1874	1413	2015	1568		433	684	5226	4092
10/2003	17	0	756	1417	1254	2085		459	206	3637	2891
11/2003	3	0	120	386	328	295		0	0	167	80
12/2003	6	134	51	194	141	98		0	0	43	64
01/2004	15	129	50	218	139	79		0	0	16	12
02/2004	14	33	122	271	237	119		0	0	101	102
03/2004	12	0	134	142	115	94		0	0	22	51
04/2004	7	63	90	42	3	0		0	0	0	17

Table 7. Monthly flow-weighted mean TP concentrations in ppb for WY02 through WY04.

Month	L3BRS	G409	USSO	L28U	S140	WWEIR	NFEED	PC17A	G108	S190	L28IN
05/2001	83	75	100	59	n/a	n/a	66			n/a	37
06/2001	56	89	124	125	98	33	47			37	43
07/2001	60	n/a	60	87	47	50	44			44	20
08/2001	58	n/a	75	32	44	64	78			66	26
09/2001	429	n/a	136	68	58	69	46			114	23
10/2001	346	n/a	59	60	48	70	n/a			96	23
11/2001	78	n/a	50	56	32	52	81			72	24
12/2001	46	28	68	36	36	51	61			38	32
01/2002	28	n/a	50	37	26	34	36			30	20
02/2002	31	17	35	34	30	38	39			38	22
03/2002	34	17	53	28	29	33	35			35	21
04/2002	73	n/a	65	19	n/a	n/a	45			43	30
05/2002	129	n/a	78	29	n/a	n/a	56			98	41
06/2002	204	66	306	60	95	32	46			46	31
07/2002	326	n/a	120	39	74	38	163			103	36
08/2002	126	47	74	43	60	55	135			98	24
09/2002	210	419	55	45	43	107	n/a			102	49
10/2002	74	61	43	73	38	56	62			78	95
11/2002	40	35	33	76	37	44	58			48	90
12/2002	12	37	35	80	36	32	46			33	50
01/2003	n/a	15	39	70	33	26	35			27	65
02/2003	17	30	48	47	34	39	28			27	46
03/2003	20	22	56	56	74	59	34			32	83
04/2003	25	32	51	40	59	26	32			27	79
05/2003	38	70	66	61	39	38		n/a	n/a	46	96
06/2003	316	n/a	53	63	36	27		81	76	39	71
07/2003	81	n/a	161	80	42	35		164	75	37	58
08/2003	n/a	n/a	150	62	37	134		140	126	101	101
09/2003	179	n/a	151	52	51	91		95	122	120	108
10/2003	69	38	74	78	48	139		103	104	135	128
11/2003	52	n/a	40	65	41	88		n/a	n/a	93	93
12/2003	41	35	27	46	30	39		n/a	n/a	33	77
01/2004	38	54	28	53	30	38		n/a	n/a	23	26
02/2004	33	24	46	43	32	41		n/a	n/a	25	33
03/2004	25	37	49	42	31	46		n/a	n/a	25	44
04/2004	41	66	48	27	27	n/a		n/a	n/a	25	32

Table 8. Flow, TP loads, and flow-weighted mean concentration for each water year.

station	water year	periods	flow	load	FWMC
			1000 ac-ft	kg	ppb
L3BRS/ USL3BRS	WY2002	200105-200204	28	11809	340
	WY2003	200205-200304	40	12542	254
	WY2004	200305-200404	11	2949	215
G409	WY2002	200105-200204	4	432	82
	WY2003	200205-200304	0	14	111
	WY2004	200305-200404	7	361	42
USSO	WY2002	200105-200204	38	3846	83
	WY2003	200205-200304	44	5261	97
	WY2004	200305-200404	47	5731	99
L28U	WY2002	200105-200204	67	5071	62
	WY2003	200205-200304	90	5717	52
	WY2004	200305-200404	93	6976	61
S140	WY2002	200105-200204	110	6460	48
	WY2003	200205-200304	136	10444	62
	WY2004	200305-200404	136	7023	42
WWEIR	WY2002	200105-200204	53	3932	60
	WY2003	200205-200304	51	3320	53
	WY2004	200305-200404	64	7544	96
NFEED	WY2002	200105-200204	3	235	55
	WY2003	200205-200304	9	923	87
PC17A	WY2004	200305-200404	11	1457	111
G108	WY2004	200305-200404	12	1801	119
S190	WY2002	200105-200204	85	9270	88
	WY2003	200205-200304	88	9484	87
	WY2004	200305-200404	118	14410	99
L28IN	WY2002	200105-200204	86	2461	23
	WY2003	200205-200304	82	4417	44
	WY2004	200305-200404	99	12256	100

Appendix

**Summary of physical water quality parameters
collected at the District's monitoring sites
for WY2002 through WY2004.**

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Table A-1. Summary of physical water quality parameters collected at L3BRS.

PARAMETER	UNIT	PERIOD	FIRST	LAST	N	MIN	MAX	MEAN	S.D.
Temperature	°C	WY2002	5/2/2001	4/16/2002	27	14.75	31.17	25.50	4.01
		WY2003	5/14/2002	4/28/2003	36	14.84	31.56	26.30	4.26
		WY2004	5/12/2003	4/27/2004	26	16.30	31.22	25.29	4.52
Field Specific Conductivity	micro mhos/cm	WY2002	5/2/2001	4/16/2002	26	339	901	685	156
		WY2003	5/14/2002	4/28/2003	35	348	984	680	176
		WY2004	5/12/2003	4/27/2004	25	355	852	628	163
Dissolved Oxygen	mg/L	WY2002	5/2/2001	4/16/2002	27	2.18	8.76	6.09	1.79
		WY2003	5/14/2002	4/28/2003	36	0.55	9.42	5.20	2.43
		WY2004	5/12/2003	4/27/2004	23	2.14	9.26	6.02	2.28
Field pH	SU	WY2002	5/2/2001	4/16/2002	27	7.13	8.33	7.72	0.30
		WY2003	5/14/2002	4/28/2003	36	7.06	8.27	7.63	0.30
		WY2004	5/12/2003	4/27/2004	26	7.12	8.27	7.68	0.36
Turbidity	NTU	WY2002	5/2/2001	4/16/2002	25	0.887	9.840	3.016	2.093
		WY2003	5/14/2002	4/28/2003	26	0.798	9.820	2.887	2.207
		WY2004	5/12/2003	4/27/2004	26	0.900	11.100	3.328	2.103
Color	PSU	WY2002	5/2/2001	4/16/2002	25	54	203	81	38
		WY2003	5/14/2002	4/28/2003	26	50	200	86	43
		WY2004	5/12/2003	4/27/2004	26	44	243	86	47
Total Suspended Solids	mg/L	WY2002	5/2/2001	4/16/2002	25	<1	10.0	4.0	2.7
		WY2003	5/14/2002	4/1/2003	15	<3	12.6	4.9	4.2
		WY2004	7/8/2003	4/27/2004	5	<3	18.0	7.4	6.9
Hardness (as CaCO ₃)	mg CaCO ₃ /L	WY2002	7/11/2001	4/16/2002	5	119.909	290.740	237.428	70.413
		WY2003	7/9/2002	4/1/2003	4	167.052	309.135	249.813	61.993
		WY2004	7/8/2003	1/20/2004	3	175.230	271.670	233.085	51.026
Alkalinity (as CaCO ₃)	mg/L	WY2002	5/2/2001	4/16/2002	25	119.60	274.13	224.22	40.32
		WY2003	5/14/2002	4/28/2003	26	144.26	286.71	234.39	42.86
		WY2004	5/12/2003	4/27/2004	26	138.00	257.00	201.66	43.82

Table A-2. Summary of physical water quality parameters collected at G409.

PARAMETER	UNIT	PERIOD	FIRST	LAST	N	MIN	MAX	MEAN	S.D.
Temperature	°C	WY2002	5/9/2001	6/6/2001	4	24.15	28.00	26.54	1.76
		WY2003	6/18/2002	4/28/2003	26	13.73	27.47	21.58	3.99
		WY2004	5/5/2003	4/27/2004	52	16.30	30.90	25.28	4.42
Field Specific Conductivity	micro mhos/cm	WY2002	5/9/2001	6/6/2001	4	579	629	613	23
		WY2003	6/18/2002	4/28/2003	26	588	932	840	86
		WY2004	5/5/2003	4/27/2004	51	308	863	652	155
Dissolved Oxygen	mg/L	WY2002	5/9/2001	6/6/2001	4	5.65	8.14	6.73	1.07
		WY2003	6/18/2002	4/28/2003	26	3.85	8.43	6.27	1.32
		WY2004	5/5/2003	4/27/2004	49	1.54	8.97	5.97	1.95
Field pH	SU	WY2002	5/9/2001	6/6/2001	4	7.69	8.10	7.93	0.17
		WY2003	6/18/2002	4/28/2003	25	7.34	8.04	7.73	0.18
		WY2004	5/5/2003	4/27/2004	52	7.06	8.32	7.69	0.34

Table A-3. Summary of physical water quality parameters collected at USSO.

PARAMETER	UNIT	PERIOD	FIRST	LAST	N	MIN	MAX	MEAN	S.D.
Temperature	°C	WY2002	5/31/2001	4/1/2002	23	18.68	29.48	24.59	3.12
		WY2003	5/28/2002	4/28/2003	48	14.04	28.64	23.47	4.34
		WY2004	5/5/2003	4/27/2004	53	15.90	29.38	23.69	4.01
Field Specific Conductivity	micro mhos/cm	WY2002	5/31/2001	4/1/2002	23	388	722	508	79
		WY2003	5/28/2002	4/28/2003	47	381	1179	518	118
		WY2004	5/5/2003	4/27/2004	52	390	849	532	94
Dissolved Oxygen	mg/L	WY2002	5/31/2001	4/1/2002	23	2.38	9.29	5.31	1.80
		WY2003	5/28/2002	4/28/2003	48	1.93	7.64	5.32	1.13
		WY2004	5/5/2003	4/27/2004	50	3.61	8.97	5.56	0.95
Field pH	SU	WY2002	5/31/2001	4/1/2002	23	6.86	7.90	7.25	0.27
		WY2003	5/28/2002	4/28/2003	48	6.90	8.28	7.28	0.22
		WY2004	5/5/2003	4/27/2004	53	6.96	7.66	7.24	0.16
Turbidity	NTU	WY2002	5/31/2001	4/1/2002	22	0.228	4.410	2.037	1.050
		WY2003	5/28/2002	4/28/2003	24	0.373	4.780	1.688	1.381
		WY2004	5/12/2003	4/27/2004	23	0.400	3.720	1.333	0.786
Color	PSU	WY2002	5/31/2001	4/1/2002	22	65	148	97	25
		WY2003	5/28/2002	4/28/2003	24	50	196	98	31
		WY2004	5/12/2003	4/27/2004	23	64	125	89	19
Total Suspended Solids	mg/L	WY2002	7/11/2001	4/1/2002	6	<1	6.0	2.3	2.6
		WY2003	7/9/2002	4/1/2003	5	<1	<1	<3	0.5
		WY2004	7/8/2003	4/27/2004	4	<3	4.0	<3	1.3
Hardness (as CaCO ₃)	mg CaCO ₃ /L	WY2002	7/11/2001	4/1/2002	4	143.595	266.567	213.687	53.478
		WY2003	7/9/2002	4/1/2003	4	188.481	232.174	206.308	20.212
		WY2004	7/8/2003	4/27/2004	4	168.614	252.071	214.458	34.599
Alkalinity (as CaCO ₃)	mg/L	WY2002	5/31/2001	4/1/2002	22	133.30	247.54	185.19	31.61
		WY2003	5/28/2002	4/28/2003	24	157.15	248.04	188.08	25.12
		WY2004	5/12/2003	4/27/2004	23	138.00	230.02	188.70	24.22

Table A-4. Summary of physical water quality parameters collected at S140.

PARAMETER	UNIT	PERIOD	FIRST	LAST	N	MIN	MAX	MEAN	S.D.
Temperature	°C	WY2002	5/22/2001	4/23/2002	17	19.01	29.65	25.78	3.51
		WY2003	5/21/2002	4/29/2003	35	15.42	30.16	23.99	4.15
		WY2004	5/6/2003	4/27/2004	53	17.80	30.33	25.18	3.67
Field Specific Conductivity	micro mhos/cm	WY2002	5/22/2001	4/23/2002	17	420	720	532	89
		WY2003	5/21/2002	4/29/2003	35	410	833	634	137
		WY2004	5/6/2003	4/27/2004	53	324	816	601	132
Dissolved Oxygen	mg/L	WY2002	5/22/2001	3/26/2002	15	1.09	7.35	3.70	1.88
		WY2003	5/21/2002	4/29/2003	33	1.08	10.00	5.68	2.44
		WY2004	5/6/2003	4/27/2004	52	1.30	8.68	4.68	2.26
Field pH	SU	WY2002	5/22/2001	4/23/2002	17	7.06	8.14	7.36	0.32
		WY2003	5/21/2002	4/29/2003	35	6.89	8.12	7.40	0.31
		WY2004	5/6/2003	4/27/2004	53	6.65	8.07	7.38	0.32
Turbidity	NTU	WY2002	5/22/2001	4/23/2002	17	0.842	4.750	1.536	0.895
		WY2003	5/21/2002	4/29/2003	17	0.842	3.610	1.911	0.789
		WY2004	5/27/2003	4/27/2004	19	0.939	3.310	2.368	0.720
Color	PSU	WY2002	5/22/2001	4/23/2002	17	41	136	79	28
		WY2003	5/21/2002	4/29/2003	17	41	134	86	25
		WY2004	5/27/2003	4/27/2004	18	54	99	73	13
Total Suspended Solids	mg/L	WY2002	5/22/2001	4/23/2002	16	<1	4.2	2.2	1.0
		WY2003	5/21/2002	4/29/2003	18	<3	7.8	<3	2.2
		WY2004	5/27/2003	4/27/2004	19	<3	5.0	<3	1.1
Hardness (as CaCO ₃)	mg CaCO ₃ /L	WY2002	5/22/2001	2/11/2002	4	181.211	264.535	215.298	35.237
		WY2003	5/13/2002	4/29/2003	6	191.877	281.689	236.486	35.471
		WY2004	7/8/2003	2/18/2004	5	169.788	242.245	210.442	28.701
Alkalinity (as CaCO ₃)	mg/L	WY2002	5/22/2001	4/23/2002	17	148.40	232.63	189.02	25.76
		WY2003	5/21/2002	4/29/2003	18	143.15	252.19	190.61	29.97
		WY2004	5/27/2003	4/27/2004	19	124.00	239.00	192.09	32.27

Table A-5. Summary of physical water quality parameters collected at WWEIR.

PARAMETER	UNIT	PERIOD	FIRST	LAST	N	MIN	MAX	MEAN	S.D.
Temperature	°C	WY2002	5/1/2001	4/29/2002	53	14.62	30.63	24.51	3.71
		WY2003	5/7/2002	4/29/2003	52	14.53	29.90	23.79	4.42
		WY2004	5/6/2003	4/27/2004	52	16.00	29.34	23.98	3.96
Field Specific Conductivity	micro mhos/cm	WY2002	5/1/2001	4/29/2002	49	237	902	633	172
		WY2003	5/7/2002	4/29/2003	52	311	853	653	140
		WY2004	5/6/2003	4/27/2004	52	195	862	633	179
Dissolved Oxygen	mg/L	WY2002	5/1/2001	4/29/2002	52	0.15	6.02	2.10	1.38
		WY2003	5/7/2002	4/29/2003	52	0.13	8.96	2.23	1.94
		WY2004	5/6/2003	4/27/2004	51	0.10	8.71	2.46	1.66
Field pH	SU	WY2002	5/1/2001	4/29/2002	53	6.85	7.87	7.19	0.24
		WY2003	5/7/2002	4/29/2003	52	6.81	7.98	7.23	0.25
		WY2004	5/6/2003	4/27/2004	51	6.77	7.44	7.10	0.17

Table A-6. Summary of physical water quality parameters collected at NFEED.

PARAMETER	UNIT	WY20	FIRST	LAST	N	MIN	MAX	MEAN	S.D.
Temperature	°C	WY2002	5/1/2001	4/29/2002	53	15.75	32.15	25.91	3.80
		WY2003	5/7/2002	4/29/2003	52	14.82	30.81	25.53	4.41
		WY2004	5/6/2003	3/1/2004	44	16.60	31.46	25.70	4.57
Field Specific Conductivity	micro mhos/cm	WY2002	5/1/2001	4/29/2002	49	198	551	456	83
		WY2003	5/7/2002	4/29/2003	52	278	540	452	61
		WY2004	5/6/2003	3/1/2004	44	206	455	401	59
Dissolved Oxygen	mg/L	WY2002	5/1/2001	4/29/2002	52	0.23	10.45	6.38	2.44
		WY2003	5/7/2002	4/29/2003	52	2.45	9.74	6.26	1.93
		WY2004	5/6/2003	3/1/2004	44	1.56	10.20	5.32	2.26
Field pH	SU	WY2002	5/1/2001	4/29/2002	53	5.84	8.16	7.63	0.48
		WY2003	5/7/2002	4/29/2003	52	6.92	8.15	7.60	0.34
		WY2004	5/6/2003	3/1/2004	43	6.85	8.06	7.39	0.34

Table A-7. Summary of physical water quality parameters collected at S190.

PARAMETER	UNIT	PERIOD	FIRST	LAST	N	MIN	MAX	MEAN	S.D.
Temperature	°C	WY2002	5/31/2001	4/29/2002	16	20.23	30.81	26.07	3.78
		WY2003	5/13/2002	4/29/2003	17	16.53	31.76	25.13	4.64
		WY2004	5/28/2003	4/27/2004	19	17.10	32.01	25.36	4.01
Field Specific Conductivity	micro mhos/cm	WY2002	5/31/2001	4/29/2002	16	303	654	521	123
		WY2003	5/13/2002	4/29/2003	17	307	606	527	89
		WY2004	5/28/2003	4/27/2004	19	252	634	523	99
Dissolved Oxygen	mg/L	WY2002	5/31/2001	4/29/2002	16	3.33	8.64	6.01	1.37
		WY2003	5/13/2002	4/29/2003	17	2.24	9.24	6.11	2.05
		WY2004	5/28/2003	4/27/2004	19	2.25	10.90	6.19	2.55
Field pH	SU	WY2002	5/31/2001	4/29/2002	16	7.02	8.03	7.55	0.32
		WY2003	5/13/2002	4/29/2003	17	7.09	8.08	7.64	0.34
		WY2004	5/28/2003	4/27/2004	19	6.87	8.07	7.58	0.40
Turbidity	NTU	WY2002	5/31/2001	4/29/2002	15	1.260	6.000	2.367	1.428
		WY2003	5/13/2002	4/29/2003	16	1.270	6.510	2.498	1.271
		WY2004	5/28/2003	4/27/2004	17	0.982	5.000	1.994	0.978
Color	PSU	WY2002	5/31/2001	4/29/2002	15	38	153	80	34
		WY2003	5/13/2002	4/29/2003	16	40	169	79	37
		WY2004	5/28/2003	4/27/2004	17	37	146	68	32
Total Suspended Solids	mg/L	WY2002	5/31/2001	4/29/2002	15	1.2	7.6	<3	1.7
		WY2003	5/13/2002	4/29/2003	16	<3	8.4	3.0	1.9
		WY2004	5/28/2003	4/27/2004	17	<3	7.0	<3	1.6
Hardness (as CaCO ₃)	mg CaCO ₃ /L	WY2002	7/24/2001	4/29/2002	6	123.070	285.455	232.110	58.299
		WY2003	7/8/2002	4/29/2003	6	195.946	280.722	242.510	29.810
		WY2004	7/22/2003	4/27/2004	6	116.715	276.765	211.411	66.511
Alkalinity (as CaCO ₃)	mg/L	WY2002	5/31/2001	4/29/2002	15	117.10	264.08	206.20	50.62
		WY2003	5/13/2002	4/29/2003	16	149.79	260.50	221.98	31.63
		WY2004	5/28/2003	4/27/2004	17	107.00	268.00	209.57	45.99